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Extracellular ribonuclease from bacillus licheniformis (Balifase), a New member of the N1/T1 RNase superfamily

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Abstract

© 2016 Yulia Sokurenko et al.The N1/T1 RNase superfamily comprises enzymes with well-established antitumor effects, such as ribotoxins secreted by fungi, primarily by Aspergillus and Penicillium species, and bacterial RNase secreted by B. pumilus (binase) and B. amyloliquefaciens (barnase). RNase is regarded as an alternative to classical chemotherapeutic agents due to its selective cytotoxicity towards tumor cells. New RNase with a high degree of structural similarity with binase (73%) and barnase (74%) was isolated and purified from Bacillus licheniformis (balifase, calculated molecular weight 12421.9 Da, pI 8.91). The protein sample with enzymatic activity of 1.5 × 106 units/A280was obtained. The physicochemical properties of balifase are similar to those of barnase. However, in terms of its gene organization and promoter activity, balifase is closer to binase. The unique feature of balifase gene organization consists in the fact that genes of RNase and its inhibitor are located in one operon. Similarly to biosynthesis of binase, balifase synthesis is induced under phosphate starvation; however, in contrast to binase, balifase does not form dimers under natural conditions. We propose that the highest stability of balifase among analyzed RNase types allows the protein to retain its structure without oligomerization.

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